

a. The table below shows the number of spectators who attended the Mahobe soccer games during last season.

Game	1	2	3	4	5	6	7	8	9	10	11	12
Attendance	20	19	24	22	20	20	20	23	28	24	26	24

- 8.9 8.9 9.2 8.4 9.0 9.6 8.9

c. Members of the Society for the Protection of Mathematicians go door-to-door to collect money for their organisation. Below is a summary of the money collected:

Donation	\$500	\$200	\$100	\$50	\$25	\$20	\$10	\$5
Number of Donations	1	1	2	2	8	10	47	9

- Find the range, mean, mode, median, and quartiles of the money collected.
- Mean, median and mode are commonly called ‘averages’. Which of the averages above is the best representative of the donations received? Give a reason.

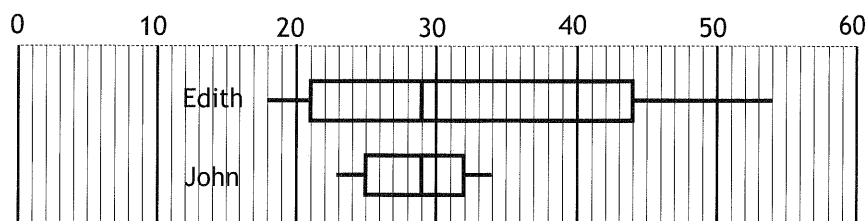
A full-page view of a blank sheet of white graph paper. The grid consists of thin, light gray horizontal and vertical lines forming small squares. There are approximately 20 columns and 18 rows visible. A dark circular object, possibly a pen or pencil tip, is partially visible at the bottom right corner.

2. Illustrating the Centre and Spread of Data

- a. Edith and John have temporary jobs in an apple orchard. They have been working together for several days. The table shows the number of bags of apples that they have picked on each day.

Day	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	TOTAL
Edith	23	38	19	50	24	54	18	29	30	285
John	24	23	26	29	27	29	34	30	34	

- Complete the table.
 - Calculate the mean number of bags of apples that Edith picked in a day.
 - On how many days did Edith pick more bags of apples than John?
- b. The information in the table is shown on the graph:



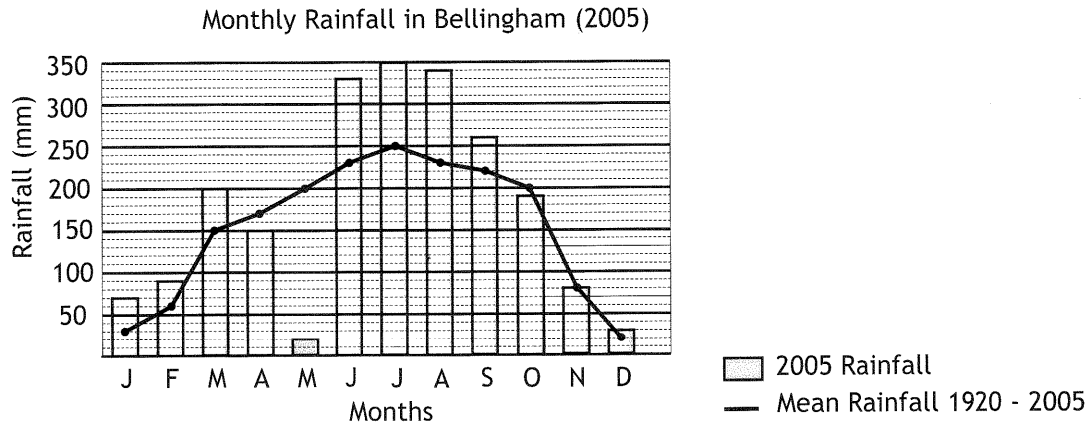
- What is the name given to this type of graph?
 - The range of the number of bags Edith picked in a day is _____.
 - The upper quartile for the number of bags Edith picked in a day is _____.
 - The orchard manager wants to employ either Edith or John in a permanent job. Analyse the data to justify which person you think the orchard manager should employ.
- c. During the next two-week period, Edith and John continue to pick apples.

Day	Mon	Tue	Wed	Thu	Fri	Sat	Mon	Tue	Wed	Thu	Fri	Sat
Edith	22	24	54	19	27	51	22	54	20	24	24	55
John	30	33	32	34	33	32	35	32	34	33	34	34

- Find the totals for both Edith and John and then give the mean number of bags picked for each.
- Draw box and whisker graphs to illustrate the number of bags of apples picked by both Edith and John.
- If you were the orchard manager, whom would you employ? Use the data to justify your decision.

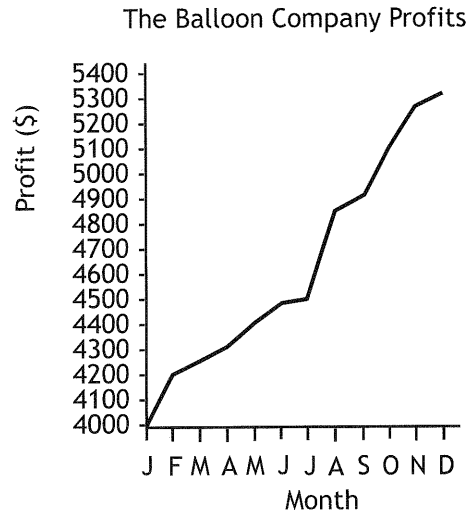
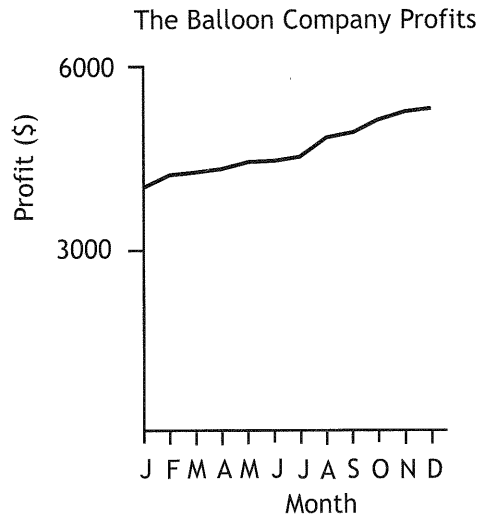
3. Using Graphs in Statistics

- a. Rainfall in Bellingham was measured over 2005. The graph below gives each month's rainfall and the median rainfall for each month from 1920 to 2005.



- i. Did more or less rain fall in 2005 than usual?
 - ii. What was the difference between the historical average rainfall and the actual rainfall in February?
 - iii. What was the percentage increase in rainfall for July compared to the historical average?
 - iv. Which month was closest to the historic average monthly rainfall?
 - v. Which month was the furthest below the historical average rainfall?
 - vi. If you were planning an outdoor tramp in Bellingham, during which month/s would you plan to go?
- b. Below is a table and graphs of company profits for The Balloon Company:

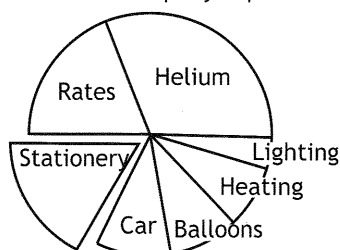
J	F	M	A	M	J	J	A	S	O	N	D
4000	4200	4250	4300	4400	4480	4500	4850	4900	5100	5250	5300



- i. Which graph is the best representation of the actual profits for The Balloon Company? Explain why.
- ii. You are the manager of The Balloon Company and have to present the profit figures to the owners of the company. There is a chance of a pay rise if they are pleased with your performance this year. Which graph will you present?

- iii. The pie chart shows how money was spent at The Balloon Company. Which is the most expensive item?

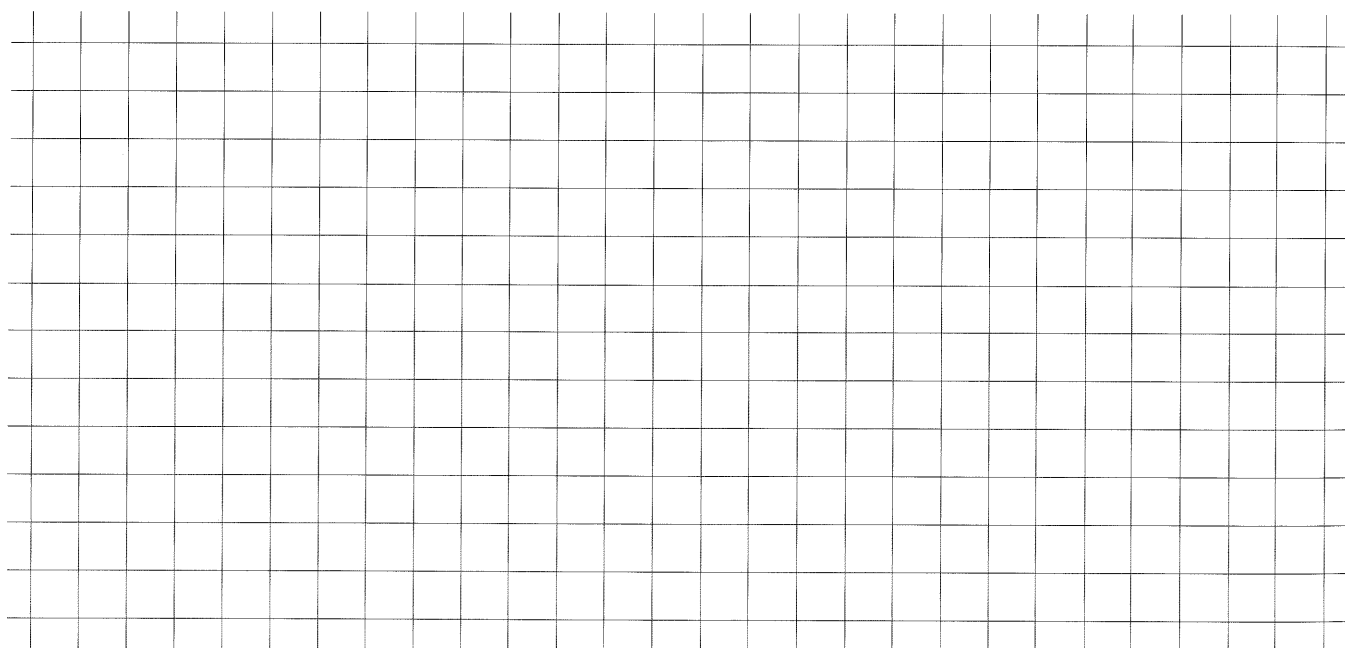
The Balloon Company Expenses



- iv. The angle of the 'Stationery' sector is 68° .
What percentage of the overall expenses is this?
- c. The Mahobe soccer team played 12 games last season. Here are the results:

Game	1	2	3	4	5	6	7	8	9	10	11	12
Result	2-1	3-2	2-0	3-1	4-1	0-5	4-3	1-0	0-0	0-2	1-1	3-1
(For-Against)												

Organise the data and draw a bar graph for goals scored by the Mahobe soccer team.

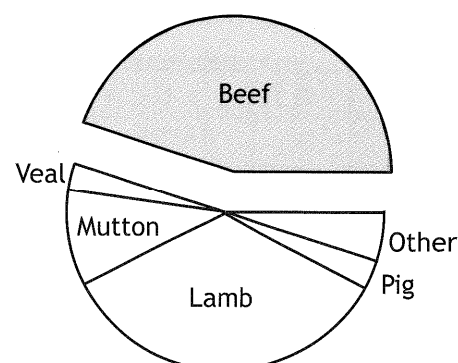


- d. This graph appeared in a farming magazine.

- i. By measuring the angle, calculate the percentage of the total exports of beef.

- ii. If we exported 20 million tonnes of meat overseas, how much would be beef?

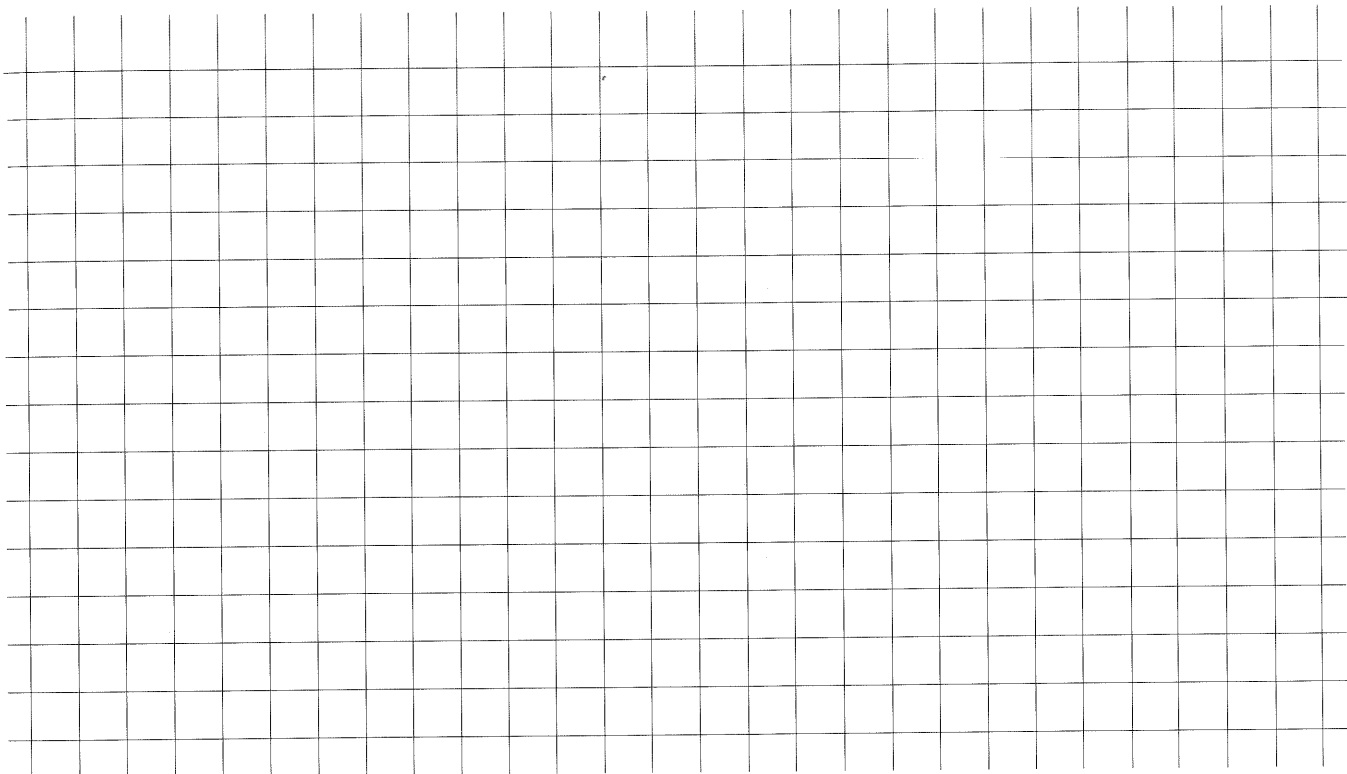
Meat Exports



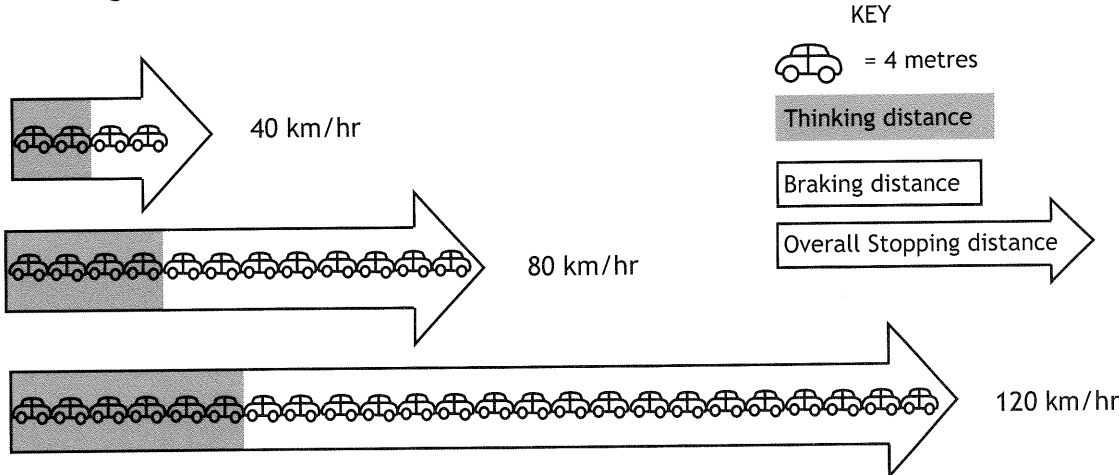
e. A class of 20 students sat both NCEA Maths and Science exams. Their results are given in the table below:

Maths	56	72	74	53	67	64	58	44	62	55	71	48	66	51	57	32	56	74	85	79
Science	75	95	94	72	80	79	78	58	79	75	84	59	89	67	73	43	67	91	98	90

- i. Draw a scatter diagram of the results and then comment on any relationship.
- ii. One particular student sat the Maths exam but was sick during Science. She received 47 in Maths. Estimate a Science mark for her.

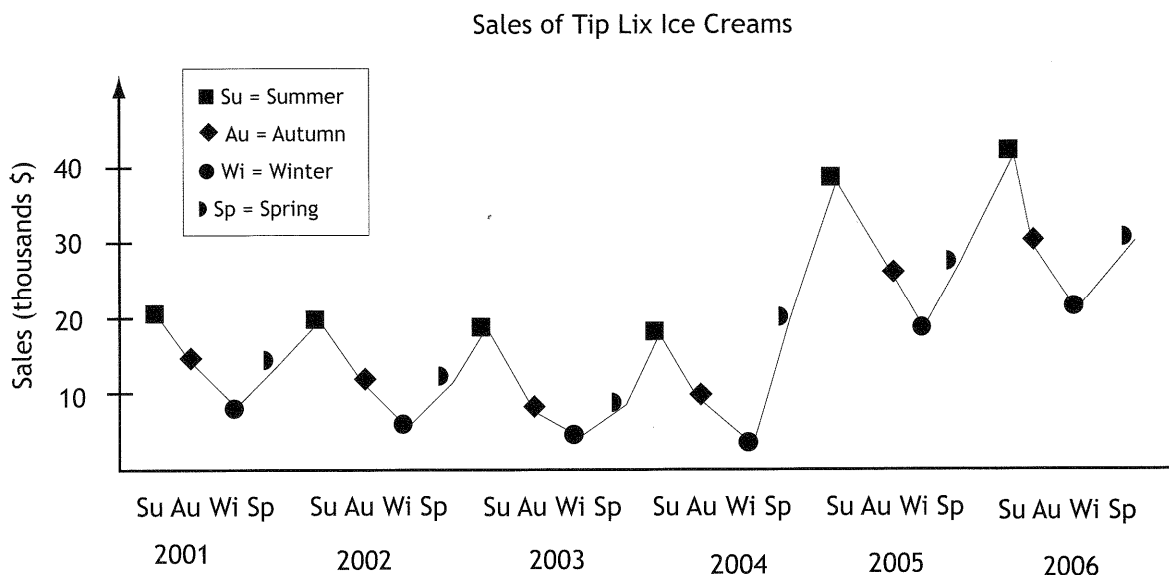


f. The diagram below gives the stopping distance for cars travelling at different speeds.

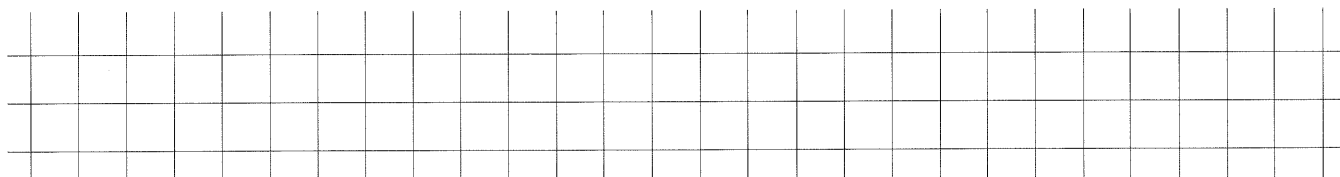


- i. What is the braking distance at 40 km/hr?
- ii. What is the thinking distance at 80 km/hr?
- iii. How much longer is the overall stopping distance at 80 km/hr compared to 40 km/hr?

- g. Graeme owns an ice-cream van and a business called Top Lix. Graeme keeps a record of all his sales over six years. During 2006, Graeme increases his sales area and working hours in an effort to get more business. The graph below uses the data from all his sales records.

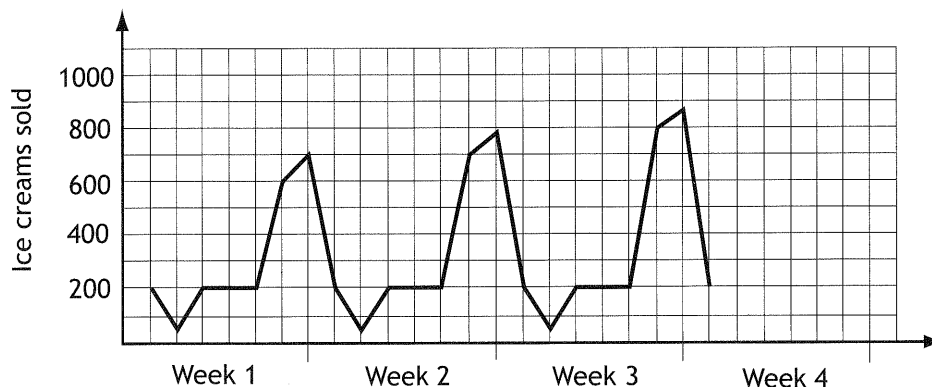


- i. Identify two trends illustrated by the graph.



Graeme decided to buy another ice cream van to service Oceanside Beach. He employs Mrs Barraclough to operate the van and asks her to record the number of ice creams sold each day. Here are her sales figures for the first three weeks:

- ii. Complete the graph for Week 4 so that the trends of the first three weeks are continued.



4. Working with Ungrouped Data

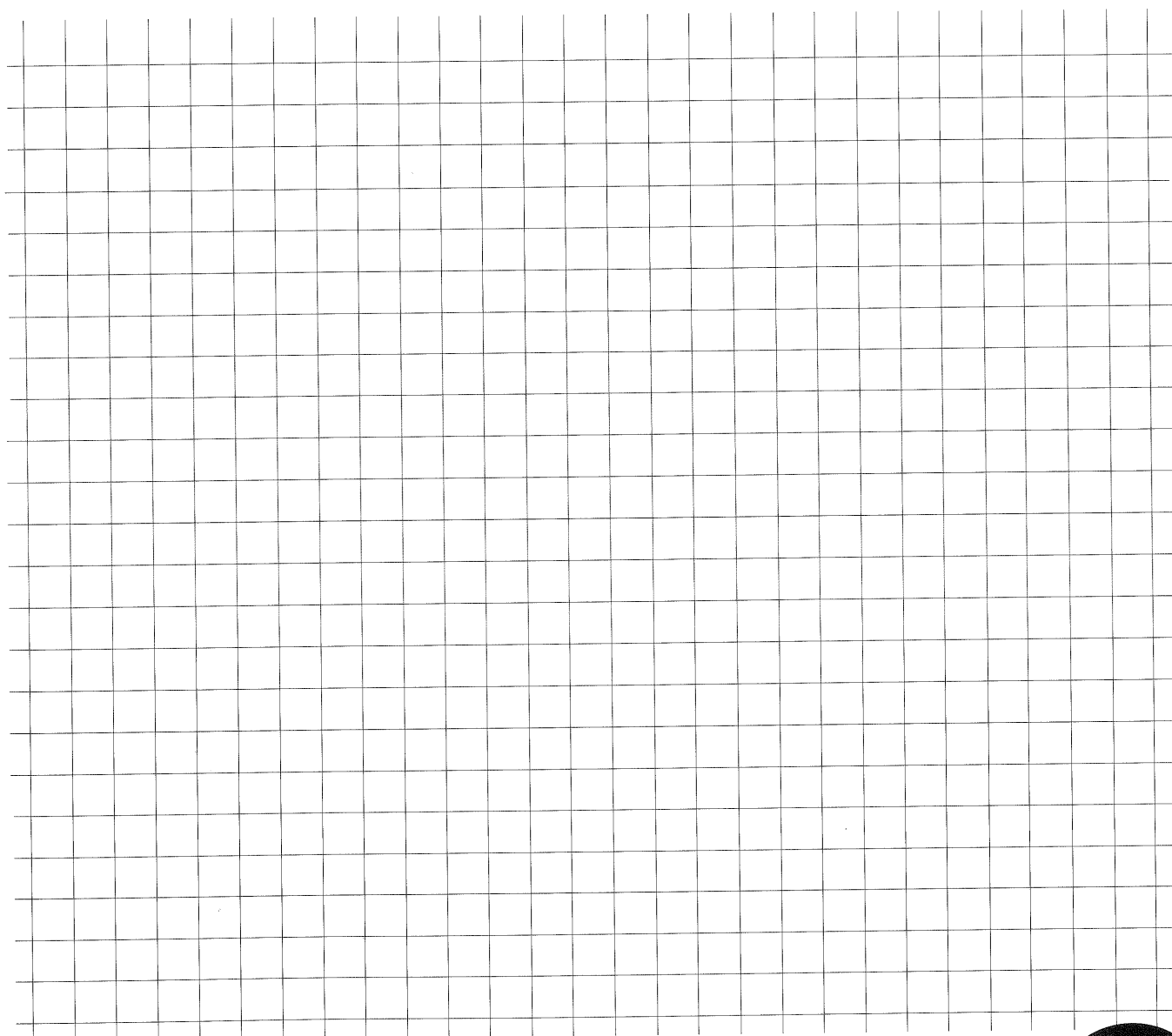
- a. The table gives average town house prices in one Auckland suburb during 2004 and 2005.

Month	Jan 04	Feb 04	Mar 04	Apr 04	May 04	Jun 04	Jul 04	Aug 04
Average (1000's)	242	241	240	231	232	233	238	235

Month	Sep 04	Oct 04	Nov 04	Dec 04	Jan 05	Feb 05	Mar 05	Apr 05
Average (1000's)	230	248	240	241	243	243	242	244

Month	May 05	Jun 05	Jul 05	Aug 05	Sep 05	Oct 05	Nov 05	Dec 05
Average (1000's)	240	238	234	240	255	254	252	245

- Graph the data
- When was the best time to buy a house in this suburb?
- When was the greatest monthly decrease in house prices?
- When was the greatest monthly increase in house prices?



5. Working with Grouped Data

- a. Seventy students ran around the school playing field. Their times are below. (All the times are given in seconds.)

55	40	42	27	78	75	56	64	48	64
73	94	49	48	52	51	55	82	84	27
34	58	66	64	72	37	54	58	61	62
74	63	61	75	59	55	89	81	12	57
63	54	71	18	58	64	77	72	69	64
67	56	74	52	71	66	64	68	55	51
73	73	98	64	62	52	57	68	55	80

- Draw up a frequency table with intervals of 10.
- Graph the results.
- Calculate the mean time.

iii. Calculate the mean time.

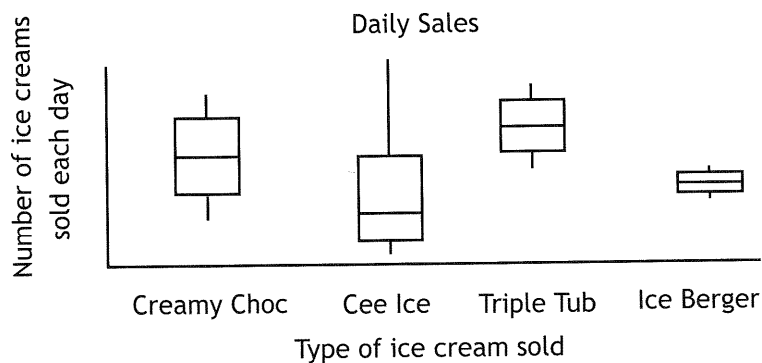
6. Comparing Sets of Related Data

- a. The Creamy Ice Company sells various sorts of ice cream. Here are the sales figures for one week in November:

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Iceberger	13	15	12	16	15	37	41
Triple Tub	12	17	15	15	12	42	45
Cee Ice	25	20	24	20	24	58	55
Creamy Choc	17	16	15	20	19	33	37

- i. Write two questions that could be investigated using this data then use the data to answer your questions.

The box and whisker graph shows an analysis of the daily sales of each of the different types of ice cream during last October.



- ii. Comment on two features of this information.

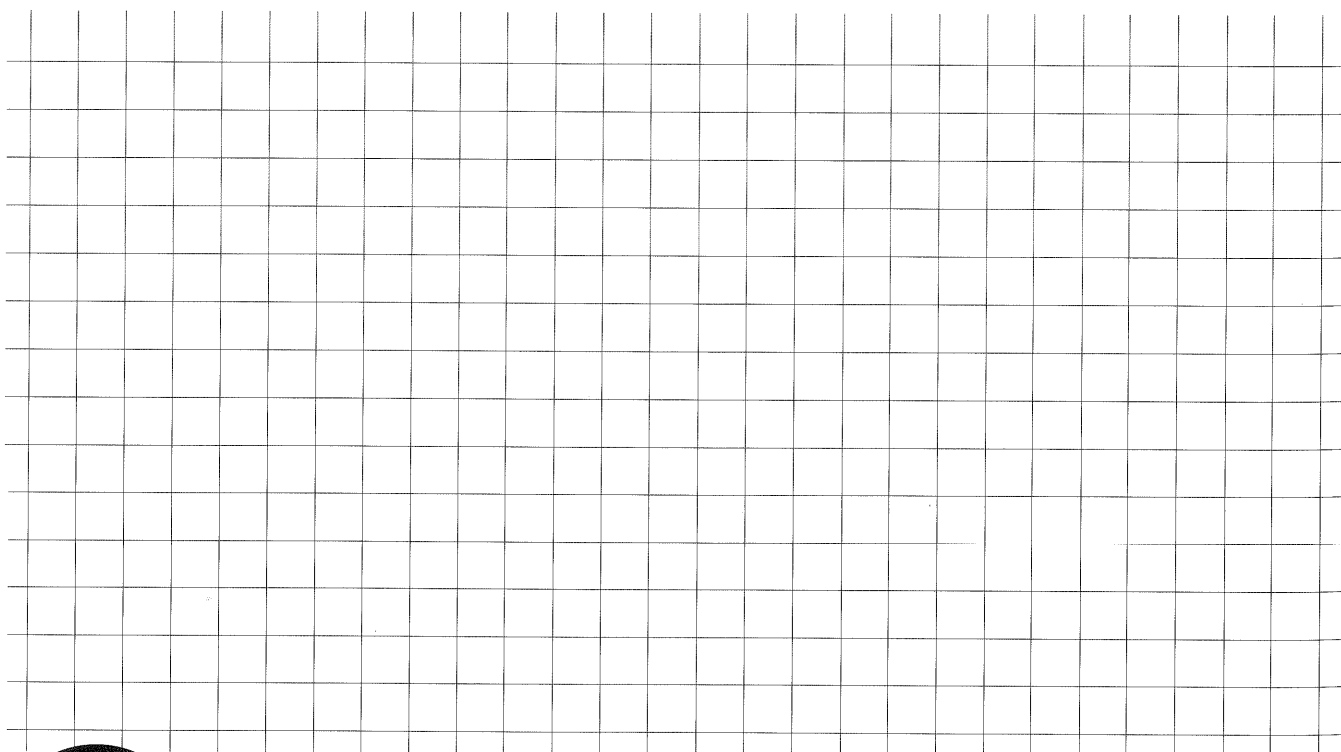
- iii. The sales of which ice cream would be the most difficult to predict?
Give a reason for your answer.

- b. A forester has sampled 10 trees in each of the two blocks of *Pinus radiata*. One block was on the north side of a hill and the other side was on the south side. Both blocks were planted at the same time.

The following data was obtained:

South Block				North Block			
Tree	diameter (m)	height (m)	leaf area (m ²)	Tree	diameter (m)	height (m)	leaf area (m ²)
1	0.269	23.7	91.98	1	0.428	24.8	331.70
2	0.277	23.1	92.98	2	0.431	25.1	335.33
3	0.254	22.5	63.96	3	0.425	24.7	310.30
4	0.455	26.1	349.64	4	0.413	24.7	302.81
5	0.388	24.6	172.39	5	0.436	25.2	337.25
6	0.255	22.5	70.20	6	0.421	24.7	315.46
7	0.253	22.4	63.96	7	0.415	24.7	305.25
8	0.251	22.4	83.33	8	0.413	24.7	307.75
9	0.261	22.9	89.32	9	0.410	24.7	259.00
10	0.269	23.0	92.34	10	0.422	24.8	331.64

- i. Pose a question that involves a comparison of two variables from this data. Your question must be clear and not open to more than one interpretation. In order to answer your question you need to compare the two variables you have chosen. The following instructions will help you to do this:
- Calculate statistics for each of the variables chosen for your investigation - at least one measure of central tendency and one measure of spread.
 - Draw appropriate graph(s) that allow you to compare your data sets.
 - Write your conclusion, making sure that your comments relate back to your question. You should explain the reasons for your conclusions by referring to your statistics and graphs.
 - Write an evaluation of your investigation.



STATISTICAL METHODS - Practice Test

QUESTION ONE

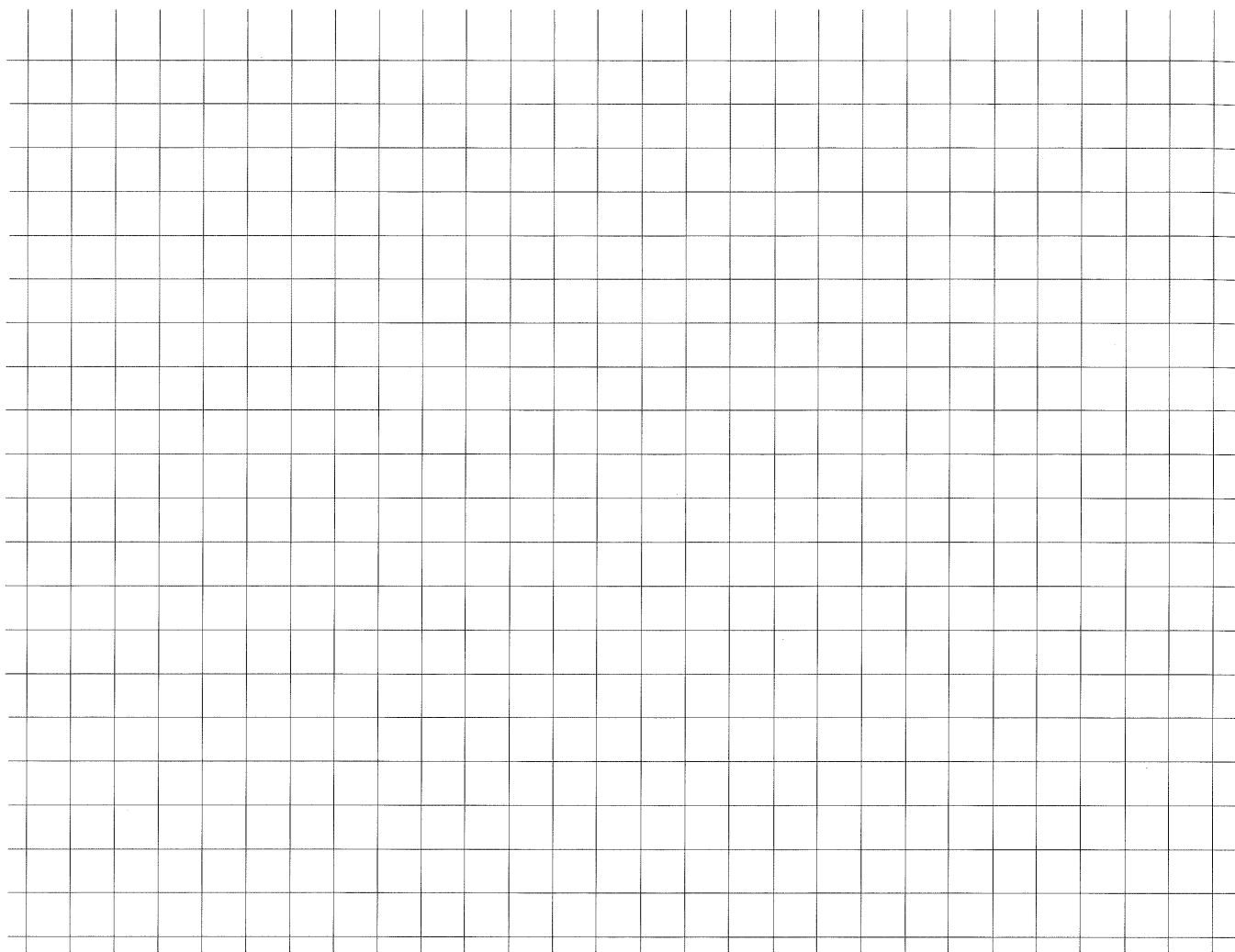
Introduction: Major brands of sausages were analysed for Calorie and Sodium content.

Type	Calories	Sodium	Type	Calories	Sodium	Type	Calories	Sodium
Beef	186	495	Pork	173	458	Chicken	94	387
Beef	181	477	Pork	191	506	Chicken	102	542
Beef	176	425	Pork	182	473	Chicken	87	359
Beef	149	322	Pork	190	545	Chicken	99	357
Beef	184	482	Pork	172	496	Chicken	107	528
Beef	190	587	Pork	147	360	Chicken	113	513
Beef	158	370	Pork	146	387	Chicken	135	426
Beef	139	322	Pork	139	386	Chicken	142	513
Beef	175	479	Pork	175	507	Chicken	86	358
Beef	148	375	Pork	136	393	Chicken	143	581
Beef	152	330	Pork	179	405	Chicken	152	588
Beef	111	300	Pork	153	372	Chicken	146	522
Beef	141	386	Pork	107	144	Chicken	144	545
Beef	153	401	Pork	195	511	Chicken	129	430
Beef	190	645	Pork	135	405	Chicken	133	375
Beef	157	440	Pork	140	428	Chicken	102	396
Beef	131	317	Pork	138	339	Chicken	106	383
Beef	149	319						
Beef	135	298						
Beef	132	253						

- a. Write a statistical question that compares aspects of the sausage analysis data.

- b. Calculate statistics for each of the variables chosen for your question.
You should have at least one measure of central tendency and one measure of spread.

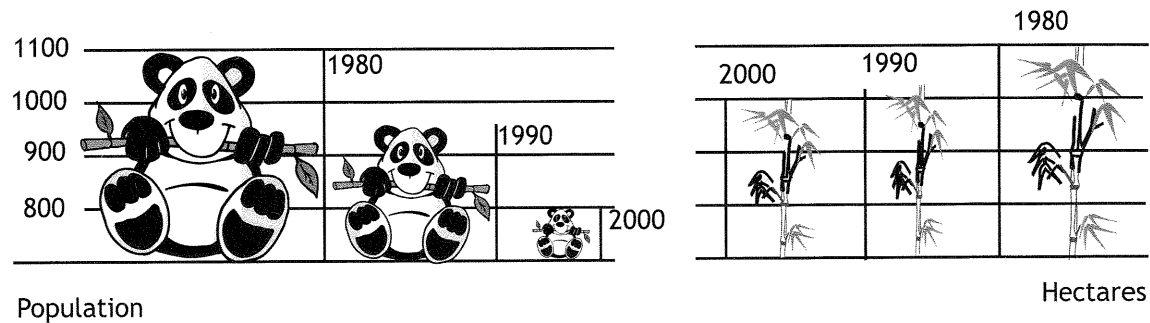
- c. Draw appropriate graph(s) that allow you to compare your data sets.



- d. Write your conclusion. This should relate back to the graph. You should also validate your conclusion by referring to your statistics and graphs.

QUESTION TWO

A nature conservation group produced the diagram below.



- a. The panda population was smaller in 2000 than in 1980. Approximately how much smaller?

- b. Give two ways in which the panda diagram is misleading.

- c. Describe briefly the change in bamboo yield from 1980 to 2000.

- d. What has been omitted from the bamboo diagram?

- e. Name one unusual feature of the bamboo yield diagram.

- f. Each of the statements below is misleading, inaccurate or unsubstantiated. Explain what is wrong with each statement:
 - i. Pandas are getting smaller because there is less bamboo to eat.

 - ii. There is less bamboo because the pandas are eating it.

 - iii. By 2010 there will be no pandas left.

 - iv. In 20 years the area of bamboo has dropped by 100 hectares.

STATISTICAL METHODS - Final Checklist

Below are the requirements of this Achievement Standard.

Check that you understand each of these key skills.

☐

For Achieve

- Compare sets of data by finding means, medians and modes.
- Draw scatter graphs, box and whisker graphs, stem and leaf graphs and bar graphs.
- Use your graphs to compare the data.
- Answer questions about the graphs, calculations and tables of data.

☐

For Merit

- Write and answer questions that compare two sets of given data.
- Justify the answers to any questions by referring to the graphs and the statistical calculations performed.

☐

For Excellence

- Comment about bias in any statistical results.
- Write about the limitations of a survey or data collected.
- Give ways to improve future surveys or data collected.
- Present all answers using correct mathematical and statistical statements in a logical way.